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The Azoic Colors on Cotton Piece Goods

By C. W. NELSON

IN 1880, Reid Holliday first introduced us to insoluble azo colors by the introduction of Vasanceine Red. This process consisted of taking the diazotized solution of Beta Naphthylamine and coupling with Beta Naphthol to produce the dyestuff on the fiber itself.

Later, a modification of this was the production of Para Red, the difference being that the base Para Nitraniline substituted the Beta Naphthylamine. This was a big improvement on the Vasanceine Red, and it was found that by using different bases, different colors were produced:

Meta Nitro Aniline .....Orange
Ortho Nitro Toluidine .....Orange
Alpha Naphthalamine .....Red
Dianisidine .....Blue
Benzidine .....Violet or Puce

These colors have excellent all-round fastness, but the disadvantage that they sublime easily, and are not very fast to rubbing. They are soluble in fats and waxes.

The goods are first prepared in a beta naphthol bath, with caustic soda and oil. They are then dried at a low temperature, and passed into the developing liquor. Great care has to be exercised in handling the cloth, and wet fingers will easily produce stains.

Difficulty was experienced with the diazotized solutions, and it was found that by the addition of aluminum sulfate to the diazotized solution of para nitraniline, a more or less permanent substance resulted. This was placed on the market in the form of Azophor Red P. N., and later as Nitrazol C., which may be looked upon as the fixed color salt of para nitraniline.

In 1912, Greiesheim Elektron introduced Naphthol A. S., and this was the starting point of a most valuable range of colors, entirely different from anything that had hitherto been produced.

Diazotized amines couple up with this Naphthol A. S., and some really excellent shades result, many of which possess the Indanthrene fastness. The old method consists in diazotizing the base, but this has been partly done away with by the introduction of a series of fast color salts, which are stabilized diazotized bases. The following are the principal Naphthols and bases now on the market. From the list it will be seen that an enormous number of possible combinations can be made.

Naphthol A. S.
Naphthol A. S.-D.
Naphthol A. S.-E.
Naphthol A. S.-O. L.
Naphthol A. S.-R. L.
Naphthol A. S.-B. G.
Naphthol A. S.-B. S.
Naphthol A. S.-T. R.
Naphthol A. S.-B. O.
Naphthol A. S.-S. W.
Naphthol A. S.-B. R.
Naphthol A. S.-G.
Naphthol A. S.-G. R.
Naphthol A. S.-L. T.
Naphthol A. S.-L. 3. G. and L. 4. G.
Naphthol A. S.-L. B.

The following are some of the principal bases and fast color salts:

Fast Yellow G. C. Base	Fast Yellow Salt G. C. 20%
Fast Orange G. C. Base.....	Fast Orange Salt G. C. 20%
Fast Orange G. R. Base.....	Fast Orange Salt G. R. 20%
Fast Scarlet G. G. S. Base.....	Fast Scarlet Salt G. G. S. 25%
Fast Scarlet G. Base.....	Fast Scarlet Salt G. 20%
Fast Scarlet R. C. Base.....	Fast Scarlet Salt R 25%
Fast Scarlet T. R. Base.....	
Fast Red G. G. Base.....	Fast Red Salt G. G. 20%
Fast Red K. B. Base.....	Fast Red Salt K. B. 20%

Fast Red T. R. Base.....	Fast Red Salt T. R. 20%
Fast Red 3 G. L. Base Special...	Fast Red Salt 3 G. L. 40%
Fast Red G. L. Base.....	Fast Red Salt G. L. 20%
Fast Red R. L. Base.....	Fast Red Salt R. L. 20%
Fast Red R. C. Base.....	Fast Red Salt R. C. 20%
Fast Red B. Base.....	Fast Red Salt B. 20%
Fast Bordeaux G. P. Base.....	Fast Bordeaux Salt G. P. 20%
Fast Garnet G. C. Base.....	
Fast Garnet G. B. C. Base.....	
Fast Blue B. Base.....	Fast Blue B. Salt 20%
Fast Blue B. B. Base.....	Fast Blue Salt B. B. 40%
Fast Blue R. R. Base.....	
Fast Variamine Blue B. Base....	Fast Variamine Blue Salt B. 50%
Fast Variamine Blue R. T. Base.	Fast Variamine Blue Salt R. T. (replacing this is now Fast Variamine Blue Salt F. G.)
Fast Black L. B. Base.....	
Fast Violet B. Base.....	
Fast Corinth L. B. Base.....	Fast Corinth Salt L. B.
	Fast Red Salt A. L. 20%
	Fast Black Salt K. 20%
	Fast Black Salt G.
	Fast Brown Salt R. R.
	Fast Orange Salt L. G.
	Fast Orange Salt R. D.
	Fast Corinth Salt V. (conc.)
	Fast Duratol Green Salt G.

A few notes may be of interest on the respective fastnesses of popular combinations. Practically all the combinations are of excellent fastness to washing and caustic soda boiling, for example Naphthol A. S.-L. T. Fast Red T. R. Base is scheduled in Group 5, representing excellent fastness by the I. G. standard. Also, Naphthols A. S.-B. R. and A. S.-G, combined with Fast Yellow G. C. Base, and a host of others. They also have excellent fastness to chemic, alkali, acid, and mercerizing. Many have supreme fastness to light, but it is interesting to note with regard to this fastness to light question, that in 1925 Haller and Rupert carried out some excellent work on the aftertreatment of Naphthol colors, with boiling soap, basing a complex theory on the distribution of the dye particles towards the central canal of the fiber, claiming that the surrounding cellulose acted in some way as a protective layer. Apparently, the real solution to the question lies in the crystal structure of the dyestuff in the canal, giving less chance of the action of light. Note that the fastness to light in some cases, and the fastness to rubbing (a point on which the azoic colors are often condemned) is dependent to a very large extent on the care of the dyer himself. This will be considered further later.

With regard to a few practical working details for piece goods, the processes of working may be divided as follows:

1. Impregnation of Naphthol on padding machine or dye jig.
2. Hydroextraction.
3. Development in diazotized base or fast color salt.
4. Aftertreatment with soap.

Prior to commencing the dyeing proper, it may be noted that a complete bleach is not usually necessary. If the goods are lightly scoured, followed by a chemic and sour, this will serve the purpose for the majority of shades.

1. Impregnation of Naphthol

The impregnation of the naphthol may be carried out either on a three bowl padding machine, and subsequently developed on the jigs, or the whole process carried out continuously on a three bowl padding machine fitted with hot-flue and tanks for developing, soaping, washing off, etc. This procedure will be mentioned later.

In the event of development being carried out on the jigs, the writer does not consider that much is to be gained by using a padding mangle for impregnation. It naturally depends on local conditions and length of the run. For short runs, the padding machine has the disadvantage that it is easy to waste large quantities of the expensive naphthol, and unless the precise quantity be calculated (and this is often impossible) the balance of the liquor will be wasted. Naphthol solutions may be kept for a short while, but decompose on standing, and precipitation takes place. Furthermore, working thus, it is very easy to spoil pieces of cloth by water drops, finger marks, inadequate batching arrangements, and so on. Note also it is not easy to calculate the exact strength of the feeding liquor. The absorption of the naphthol depends on the nature of the goods, and the rate of the machine. As a general rule, inferior fastness to rubbing is obtained by padding methods. Note especially, two bowl padding machines are definitely not satisfactory.

It will probably be agreed, therefore, that padding the naphthol presents difficulties, and it is a commoner practice to carry out the impregnation on the jigs themselves.

The proportion of the naphthol solution does really represent an important item in the production of successful azoic dyeing. A good naphthol solution is important, and must be made up with care. The naphthol powder is first pasted up with monopole soap, or turkey red oil. Oleine that has been left alkaline with ammonia must not be used. When a perfectly smooth homogeneous paste is obtained, then can be added the calculated quantity of caustic soda. To this is added hot or boiling water, and a perfectly clear solution should result. Only the softest water possible must be used. This is also an important factor, and must not be ignored if the best results are to be obtained. Finally, the liquor is strained, and if made up in the manner described, will strain like water. No deposits or residue should be left in the strainer.

Having prepared our naphthol solution, the dyeing may be carried out. The pieces are run on the jigs in the ordinary manner, not forgetting, of course, to use only soft water. The solutions of Naphthol A. S.-S. W. and A. S.-T. R. quickly become turbid unless pure water is used. The naphthol solution may be added to the dye jig in the ordinary manner with the addition of the requisite quantity of caustic soda. A little formaldehyde is usually added to the bath except in the case of Naphthols A. S.-B. R. and A. S.-G. Formaldehyde forms an additive compound with the naphthol and stabilizes the naphthol against subsequent hydroextraction or exposure to air before development.

Impregnation is carried out usually for half an hour to one hour. The higher the temperature, the less affinity the naphthol has for the fiber. Cotton has a direct affinity for these naphthols, which in themselves may almost be looked upon as weak direct dyestuffs. The addition of Glauber salt increases the absorption of the naphthol, and it is usual, after working for say 4 ends (35 minutes) to add about 8 lbs. each end of Glauber salt. Obviously, from an economical working standpoint, the maximum possible amount of naphthol must be absorbed by the fiber. There are several factors controlling the absorption of the naphthol, namely:

1. Different naphthols have different affinities for the same fiber.
2. The smaller the ratio of cloth to liquor, the more naphthol will be absorbed from the bath.

It must also be pointed out that there is a difference between the amount of naphthol dyed on the cloth and the amount of naphthol adhering mechanically. It is important to ensure as far as ever possible that the naphthol is dyed, and when the cloth is dried, not merely dusted on the fiber. The naphthol adhering mechanically, gives bad rubbing, and strange to say, when the dyeing is completed, the difficulty can rarely be overcome. Once a naphthol color rubs, due presumably to the original amount of naphthol adhering to the fiber mechanically, any amount of aftertreatment will have little or no effect on the fastness to rubbing.

All these factors may appear somewhat beyond the dyer's control, and demand of the most specialized knowledge, but one cannot emphasize too strongly the importance of adhering to all details and the utmost attention to every possible point.

2. Hydroextraction

With piece goods, it is usual to subject the goods to a mangling and drying process before entering the developing liquor. Messrs. I. G. Farbenindustrie Aktiengesellschaft recommend that the goods be not bone dry, but left with a small amount of moisture. Under ordinary working conditions, it is difficult to ensure this ideal state of affairs, and the writer thinks it is far safer to ensure that the goods are perfectly dry after leaving the drying cylinders. The goods should be developed immediately after drying, and if this is not possible, they should be carefully covered up, free from light and moisture.

3. Development

Immediately after drying, the goods are usually run straight into the developing bath on the jig, which may consist of either a solution of the diazotized base or a fast color salt.

The diazotizing solutions are tricky to prepare, and it is important that the solution when ready for use should not contain free hydrochloric acid, nor an excess of sodium nitrite. The hydrochloric acid may be detected by turning Congo Red paper blue, and an excess of sodium nitrite turns potassium iodide starch paper blue. The free mineral acid must be removed before using the solution, as it causes weak and streaky dyeings. Note that the diazo solution keeps best with acid, and on neutralization, it will only keep for half to one day. Care must be taken to ensure that water not above 10° C. is used, otherwise decomposition will take place. Residue is usually left in the diazo solution, especially when neutralizing with chalk, and must be filtered before use. The following represents a typical example of the diazotization of Fast Red R. C. Base.

Make into a paste:

2 lbs. Fast Red R. C. Base, with
2 pts. warm water, and
2½ galls. of cold water. To this is added
2 pts. hydrochloric acid 32° Tw.

Slowly add to the above mixture:

15 ozs. sodium nitrite dissolved in a little water. The paste should now be entirely dissolved and after standing for 30 to 45 minutes, diazotization should have taken place. Dissolve in water 10 ozs. soda ash along with 30 ozs. aluminium sulfate. Neutralize the diazo solution with this basic aluminium sulfate, after having tested with Congo paper whether more soda solution is required. Dilute to the necessary volume, and work the mixture at 10° C. on the jigs.

Unfortunately, the use of fast color salts has considerably curtailed the use of these diazo solutions, and although probably slightly more expensive, fast color salts are generally used on account of ease of working.

The fast color salt solution is easily prepared. The calculated quantity of the salt is dissolved in ordinary cold water, and strained into the jig. Note that there is no point in dividing this liquor equally over two ends, as the Naphthol can only combine with the fixed amount of salt.

Diazopon A

With the object of increasing the fastness to rubbing, Messrs. I. G. Farbenindustrie Aktiengesellschaft have placed on the market a protective colloid—Diazopon A. According to circumstances, 1-4 gms. Diazopon A. are used per liter of developing solution.

In certain cases, there is no doubt that slightly increased fastness is obtained through the use of this product.

4. Aftertreatment of Naphthols

The final process of dyeing must not be neglected or overlooked in any way. This stage is as important as any of the pre-described.

The goods are given three cold waters off, and it is advisable to follow this with a weak sour (1½ pints each end hydrochloric acid 32° Tw.) and three washes off in order to completely destroy any aluminium soaps that may have been formed. Again wash off thoroughly, and the soaping may be commenced. Soaping is usually carried out for ¾ to 1 hour, with the addition of say ½ lb. of soda ash.

A dyer will find that soaping is important so far as the production of the required shade is concerned, for example, Naphthol A. S.-B. O. and Fast Red Salt B. will give a very yellow shade of claret until soaping has been properly carried out. Frequently, the process must be repeated to ensure the required shade. Apart from the shade point of view, it is important to note that soaping is imperative so far as fastness to rubbing is concerned, and dependent on this is the fastness to light, as pointed out previously.

The following represents a typical working recipe (taken from the I. G. Handbook—"Naphthol A. S. and its application"):

Claret from Naphthol A.S.-B.O. & Fast Red B. Base

100 kg. mercerized piece goods, dyed on the jigger. (Volume of liquor 1 :4).

Impregnation

400 liters liquor, containing
3 gms. Naphthol A. S.-B. O. per liter.

Naphthol A. S.-B. O.	1.2 Kg.
Turkey Red Oil 50%	1.8 liters
Caustic Soda 62° Tw.	3.6 liters
Bulk up to	100 liters

Charge the jigger with 50 liters of this solution and make up to 250 liters. Sieve one end and then add the remaining 50 liters of the solution.

Impregnation is complete in 6-8 passages.

Temperature—30° C. (85° F.)

After impregnation, squeeze off on the water calender, and dry on the cylinder drying machine or on a pin stenter.

Development

a) Starting bath.
400 liters liquor, containing
3 g. Fast Red B. Base per liter.

b) Feeding liquor.
For every 100 kg. developed goods 0.9 kg. Fast Red B. Base must be added.

	Starting Liquor	*Feeding Liquor*
Fast Red B. Base...	1.2 kg.	0.9 kg.
Sodium Nitrite	0.515 kg.	0.39 kg.
Hydrochloric acid 32° Tw.	2.05 l.	1.55 l.
Sodium acetate	1.2 kg.	0.77 kg.
Acetate Acid 50%..	1.29 kg.	1.25 kg.
Common Salt	20.00 kg.	5.00 kg.
Maks up again to...	400 liters liquor	400 liters liquor

Temperature 12° C.
6-8 passages are required for developing.

Aftertreatment

After developing rinse twice cold, once hot and then treat boiling with the addition of 1 g. soda ash and 3 g. soap per liter.

Continuous padding may be conveniently carried out for runs of 25 pieces and upwards, but it is only fair to point out that the path is strewn with difficulties. The arrangement usually consist of:

1. Three cylinder padding machine for impregnation.
2. Hot-flue.
3. Air passage.
4. Developing bath.
5. Cold rinsing bath.
6. Soap bath.
7. Hot rinsing bath.
8. Cold rinsing bath.
9. Drying cylinders.

compiled similarly to an open soaper. Obviously, large quantities of liquor are necessary, and unless good running is given to one shade, the process will be rendered prohibitive on account of the large waste.

From the dyer's point of view, perhaps the biggest difficulty in azoic dyeing is ascertaining the amount of naphthol and salt required, and ensuring that he has got the correct combination. Once a wrong combination be selected, it is usually impossible to remedy the error. With naphthols, the correct amount of dyestuff must be on the fiber first time. There is no such thing as taking a pattern out and making further additions of color. We simply have to depend on our confidence and carry the whole lengthy process through to the end before seeing a pattern. Of course, if too small a quantity of naphthol has been used, then some may be added afterwards and further fast color salt added, but obviously this will entail re-naphtholing, drying, further development, washing, souring, soaping—a process that must take half a day under the most efficient control. It is often impossible to remedy the mistake in naphthol dyeing, but the introduction of Decamine A. has simplified the stripping. If this be carried out on the jigs difficulty may be experienced from dark selvedges, but if a machine is available for treatment under the liquor, very many of the combinations can be stripped to a pure white.

In conclusion, I have attempted to give a brief outline of the general methods of application of these colors to cotton piece goods only. I understand there are many special points to be noted by dyers of warps, cheeses, etc.

The method of working is tricky, and demands of the utmost exactitude throughout the whole operation, but nevertheless we now have a comprehensive range of some of the fastest colors on the market. The cost is such that they may to some extent eventually replace the vat colors. At any rate, a dyer specializing in these colors may rest assured that he is studying a range of dyes that has very far-reaching possibilities, and which is increasing in popularity day by day.

Notes on

Jute Dyeing

By J. C. HUDSON

JUTE, by reason of its physical characteristics, can hardly ever attain the popularity of linen for domestic use, but in commerce, it finds a useful market for every grade of sacking cloth or hessian, rug, mat and carpeting backing, and rough purposes generally where harsh weaving qualities are wanted. It is also used to some extent in conjunction with cotton and linen. Cotton and jute pile fabrics are often found, the pile usually being of a particularly lustrous quality of jute. It is chiefly obtained from the Indian "Copchorus Capsularis" and is prepared by a brief process of retting, similar to that of linen.

The bleaching of jute is a difficult and slow business, and a full bleach gives only an ultimate cream shade. It should be noted that jute is more easily attacked by acids and alkalies than any other vegetable fibre and it also has the property of absorbing chlorine and bromine, and excess of bleaching liquor will easily result in a weakened fiber. Not only will a tendered fiber easily occur, but an unsuitable bleach readily causes excessive shrinkage and a harsh and brittle fiber, which often loses a great deal of its lustre. Various different processes for the bleaching have been suggested and are carried out. The following is a suitable method:

(1) Steep overnight in lukewarm water, with addition of ½% Rapidase.
(2) Wash off.
(3) Boil ½ hr. in soda ash, 5 lbs./100 gals.
(4) Steep 10 hrs. in sodium hypochlorite ½° Tw.
(5) Wash off.
(6) Sour 1½ hrs. in hydrochloric acid ½° Tw.
(7) Wash off.
(8) Permanganate of potash treatment. 1½ lbs./100 gals. and 2 pints vitriol. 1 hr. cold.
(9) Clear with sodium bisulfite.
(10) Wash off and "blue" to shade with ultramarine.

The acid dyestuffs are chiefly used for the dyeing of this fiber, but in addition, direct, basic, sulfur and sometimes vat colors may be employed.

The acid dyestuffs penetrate the hard and tough fiber better than other classes of color, though satisfactory results in this connection are usually evident with the substantive colors. Dyeing is commenced cold with the addition of 2-3% acetic acid or 5% alum, the latter undoubtedly giving better exhaustion and hence the fuller shade. With the heavier shades, 10%-20% Glauber Salt may be added with advantage. The following acid dyes are especially useful jute colors: Fast Red A types, Indian Yellows, Benzyl Green B types, Quinoline Yellow, Orange II, Coomassie Violet 2RS, Acid Violet 6B, Polar Reds, Opaline Scarlets, Acid Green conc., Acid Base Black types, Napthalene Black 12B. Note that many of the acid colors are unsuitable, as they exhaust rather poorly and therefore prove very costly in use for a low grade fiber.

Practically all basic colors will color jute without any mordanting, though their chief fault is poor penetration. This is especially evident in mixed shades and the interior of the thick yarn is often a different shade from that of the outside. The Eosine colors give particularly bright hues, though their high cost is a great drawback to their use in practise. The latter class of colors may be dyed successfully with the addition of 20%-30% common salt near the boil, using the minimum of dye liquor.

In addition, for comparatively fast brown shades, metachrome brown and similar products have been found useful. This class of dyestuff may be applied in a single bath, with the addition of bichromate of soda and acetate of ammonia.

The sulfur colors may be applied to jute in precisely the same manner as they are applied to cotton. As may be expected, very flat and dirty looking shades result.

The vat colors may be applied to piece goods by the Prestabit padding method, but on account of the impossible penetration obtained by ordinary jig methods, such are not satisfactory. The unreduced vat color is pasted with a quantity of Prestabit Oil V. or Finnassol K.B., and the goods are padded on a three bowl padding mangle. They are afterwards transferred to the dye jig and reduced in hydrosulfite and caustic soda. Sometimes, an intermediate drying operation is advantageous, so far as increased penetration is concerned.

A fair variety of jute-cotton union fabrics is met with in commerce, and the efficient coloring of these materials frequently presents the dyer with many practical difficulties. The outstanding difficulty encountered with this class of work is in obtaining a fabric of uniform depth of shade on both fibers. The cotton invariably shows up

lighter than the jute. Dyeing is usually carried out in a winch machine, though with certain cloths, padding methods may advantageously be employed. It is of course important to note that in the case of all comparatively light shades, the cloth ought to be bleached before dyeing, but with the darker shades, dyeing may be successfully carried out without any previous treatment. For example, light grey and dove shades will be bleached every time before dyeing, as there is no substantive blue or violet dye bright enough to kill the natural brown color of the jute, in effecting the shade conversion to grey. The following direct colors are suitable: Direct Yellow R., Benzopurpurine 4B., Direct Deep Brown R., Direct Sky Blue F.F., Direct Black E., Chlorazol Bordeaux 6 B.S., Diphenyl Fast Orange W.S. and so on.

The goods are entered at the boil; steam is then shut off, and the batch is allowed to circulate for a few minutes, after which an addition of 5%-15% common salt is made, in order to secure good exhaustion. The goods are allowed to run in the cooling liquor for about one hour, this procedure enabling the cotton to better absorb the substantive dye. If the bath is boiled, the cotton generally comes up lacking in depth of shade. In most cases, an addition of 1%-2% soda ash assists penetration and levelness. As a general rule once direct colors are unlevelly dyed on these goods, rectification cannot easily be carried out by a vigorous boiling of the bath. Direct dyestuffs appear to hold tighter to this bast fiber than they do to cotton. Boiling is certainly advantageous so far as the penetration of the jute fiber is concerned, but when it comes to a question of equable depth of color in each fiber, better results are obtained dyeing between 80° C. and 90° C.

With a view of obtaining more level dyeings, the author conducted a series of experiments using Gardinol, Syntex, Igepon T. and similar sulfonated fatty alcohol products. In all cases, the results were slightly better, but the high cost of these products must be very seriously considered.

In certain cases, the coloring of jute and cotton unions is claimed to be more equably achieved by padding in a thickened starch solution. The starch, dextrine or whatever thickening be employed, appears to bring about a more equable distribution of color between the two fibers. Take the following as a typical padding recipe:

3pcs. Elephant quality. Ecru shade to pattern.

8 ozs. Direct Yellow R.
14 ozs. Direct Brown R.
10 lbs. Wheat Starch.
2 pints Oleine 50%.
2 lbs. Glauber's Salt.

25 gallons.

Pad twice at 90° C., and dry.

Certain cloths may be more satisfactorily dyed in the winch machine, as received direct from the manufacturer (i.e. without any bleaching or desizing). Some materials may reach the finisher loaded with quantities of vegetable size, and without any previous treatment, such goods are entered immediately into the machine. The one drawback to this procedure is that in the case of standing baths, the dye liquor begins to decompose with a subsequent destruction of the remaining color in solution. This trouble is possibly brought about through an organic fermentation of the vegetable size, yielding a reduction product with gradually destroys the remaining dyestuff in the bath. It should be added that this is a difficulty I have frequently encountered, though have never seen it mentioned elsewhere. In an endeavor to prevent such decomposition, I have tried the addition of a certain well known anti-mildew preparation without success. However, I have found it more economical in the end, to run off the liquor for every batch; moreover, the wastage is not too great in the majority of cases of jute and cotton unions because of the high affinity of jute for the dyestuff.

It does so happen that dyeings do go wrong occasionally and stripping has to be effected. Hydrosulfite and zinc oxide are usually employed in the case of dark shades, but for pale hues, a boil in soda ash (4 lbs./25 gals.) for one hour will suffice.

The dyer of jute-cotton unions often has to do a little "shading" or rather "painting" of the shade, on completion of the main dyeing operation. It may be that the jute requires greening or reddening in order to match the cotton better. For this class of work, I advocate acid dyestuffs, such as those enumerated previously. These are usually worked in a fresh cold bath, containing say 1% formic acid. It will be found that the jute will absorb an appreciable amount of acid color in the cold acidulated bath, but to warm up the bath would be too risky. The direct dyestuff on the cotton would probably get thinned off and perhaps then be absorbed by the jute with dire results to the shade. After shading, the unions must be dried without rinsing, otherwise the color would be partially washed off the jute.

Basic dyes are seldom used on cotton-jute unions, though these dyes are often a necessity in the case of very bright shades. Generally, the penetration of the jute is poor with the basic colors, and the tendency is to obtain unlevel dyeings. They are of course absorbed by the jute without any previous mordanting. Perhaps the basic dyestuffs are more generally employed for brightening and topping direct colors. This operation may be carried out in a mild acid bath, such as acetic acid, but the utmost caution is necessary in securing slow and equable absorption of color, as the jute invariably tends to take the lion's share of the basic dye.

Since the available amount of literature dealing with jute dyeing is not extensive, it is hoped that the foregoing notes will prove of assistance to dyers vainly searching for information on the subject.

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AUGUST 13, 1934

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THE following systematic scheme, when carried out in the given sequence, serves for the rapid identification of rayons. This method can be depended upon by an experienced analyst, particularly when used in conjunction with *filament count* and *microscopical characteristics*. For the inexperienced man we recommend the detailed method of Rayon Analysis, and in comparison of the unknown rayon with standard samples of known make. The standards should be as inclusive of the rayon field as possible and should be kept up to date.

RAPID METHOD

Test 1—Identification of Animal Fibers

Millon's Test

Animal fibers—real silk, wool and hair—are quickly and positively identified by means of Millon's Reagent (See Identification of Rayon—Detailed Method.)

Test 1A—Identification of Animal Fibers, Cellulose Fibers and Cellulose Acetate

Flame Test

Twist five or six strands of the unknown sample into a long, compact mass. Push the end of sample gently toward a match flame. (Do not allow sample to actually touch the flame.)

Animal fibers tend to fuse and burn slowly when brought near to a flame. If the flame of the burning fibers is extinguished, the odor of the white fumes which subsequently arise from the smoldering end will have a "burned hair" odor. The burned ends of the fibers will have a dark, hard, brittle knob of material. Heavily mineral-weighted silks will leave a distinct ash which more or less retains the shape of the original material.

Vegetable fibers and most rayons do not fuse in the burning. They burn rapidly, and the fumes coming off after the extinguishing of the flame smell like burning cotton. *Acetate rayons, in burning, smell like cotton and melt like animal fibers.* The fused knob remaining after the flame is extinguished is hard but not brittle. If heated to a sufficient degree (in an evaporating dish or other suitable container) acetate fibers will melt without burning.

The burning test, while helpful, is not as instructive as the Million's Reagent Test, inasmuch as it does not show the relative quantities and locations of the animal and vegetable fibers in mixed yarns or fabrics.

Test 2—Identification of Cellulose Acetate Rayon

Solvent Test

Cellulose Acetate Rayon is soluble in acetone; also in boiling 40% Acetic Acid. (See Identification of Rayon—Detailed Method.)

Test 3—Identification of Nitrocellulose Process Rayon

Diphenylamine Test

Nitrocellulose Rayon is turned blue by treatment with a solution consisting of 1% by weight of Diphenylamine dissolved in concentrated sulfuric acetic acid mixture. (See Identification of Rayon—Detailed Method.)

Test 4—Identification of Viscose and Cuprammonium Rayons

Wright's Stain Test

Wright's Stain Test solution colors air-dried Cuprammonium Rayon violet and air-dried Viscose Process Rayon blue. (See Identification of Rayon—Detailed Method.)

DETAILED METHOD

Chemical Identification of Rayon

(1) Identification of Animal Fibers in Mixed Fabrics

Millon Test

As small quantities of animal fibers present in unknown samples may cause confusion in some of the following tests, an unknown sample should first be tested for the presence or absence of animal fibers. These are easily and quickly identified by means of the Million Test, details of which follow:

Preparation of Millon's Reagent

Millon's Reagent is prepared by dissolving a given weight of metallic mercury in its own weight of pure concentrated nitric acid at room temperature in a non-corrodible container (porcelain, glass, agate, etc.). When completely dissolved, the solution is diluted and mixed with an equal volume of cold water. The solution should be clear.

If a yellow turbidity develops in the above noted solution, stir in a small quantity of nitric acid until the solution clears up.

Each new batch, or one which has stood open to the air for a long time, should be tested for proper activity by matching to the skin or by use of white animal fibers. When stored in air-tight glass stoppered bottles, the solution keeps for months.

Use of Millon's Reagent

Moisten the unknown swatch with Millon's Reagent. Warm to blood heat (do not boil) for a few seconds, or allow to stand for a few minutes at room temperature.

Animal fibers turn red, thus showing both their presence and position or distribution throughout the pattern.

Nearly all dyed animal fibers show an observable change toward red in this test without previous stripping of dye.

Swatches wet with water or with alcohol appear to react normally if flooded with reagent (to dissolve first precipitate).

Caustic Test

As minute quantities of cellulose and rayon fibers present in unknown samples largely composed of animal fibers may not be detected by the Millon Test, we recommend a subsequent caustic test for fabrics that appear by the Millon Test to be composed largely or entirely of animal fibers.

Although strength of solution, time and temperature may be varied over wide limits we recommend a ten per cent solution of caustic soda at 180° F. for ten minutes.

Animal fibers dissolve completely. Cellulose and rayon remain in fiber form. (Note—Cellulose Acetate is partially saponified; regenerative cellulose fibers soften and dissolve to a limited extent. Cellulose Acetate fibers may be removed previously to caustic boil by use of acetone.)

(2) Identification of Cellulose Acetate Rayon

(a) *Acetone Test:*

Place yarn or fabric in U.S.P. acetone.

Cellulose Acetate is very readily dissolved.

So-called *"iron-proofed" Cellulose Acetate partially dissolves and leaves a leathery residue.

All other Rayons are unaffected by this treatment.

(b) *Acetic Acid Test:*

Place yarn or fabric in a boiling solution of 40% acetic acid (C.P. acid is not necessary).

Cellulose Acetate is very readily dissolved.

So-called *"*iron-proofed"* Cellulose Acetate partially dissolves and leaves a leathery residue.

All other rayons are unaffected by this treatment.

(*) *"Iron-Proofed" Cellulose Acetate:*

"Iron-proofed" Cellulose Acetate is Cellulose Acetate that has been treated with an Alkaline medium in such a way that the outside of each individual filament is partially saponified.

"Iron-proofed" Acetate yarn may be pressed or ironed at a higher temperature than untreated Acetate, because the layer of saponified or partially saponified acetate insulates the unaffected core of the yarn.

Treatments similar to iron-proofing, but more drastic, produce partially saponified yarn or fabric that can be dyed with direct cotton colors.

Partial saponification other than for iron-proofing is occasionally practiced. Such yarns produce a very considerable residue when treated by the acetone or acetic test for Cellulose Acetate.

(3) Identification of Nitrocellulose Rayon

Apply one drop of diphenylamine solution* to the dry unknown sample.

Nitrocellulose Rayon immediately turns a deep blue color after which it slowly dissolves to form a blue solution.

Other rayons are not colored blue.

All nitrated fibers—for example, Viscose Process Rayon nitrated for the production of special effects—show a blue reaction with diphenylamine solution. Many dyestuffs show a blue coloration when exposed to diphenylamine solution.

Nitrocellulose samples that have been stripped in a strong reducing bath will sometimes fail to give the blue coloration described above, however, their cross-sections remain unaltered in shape.

The only positive test for Nitro Cellulose Rayons is a microscopic examination.

**Diphenylamine solution is prepared as follows:*

Mix 66 grams concentrated sulfuric acid with 33 grams of glacial acetic acid, then add 1 gram Diphenylamine.

(4) Identification of Viscose and Cuprammonium Rayon

(a) *Wright Stain Test:*

Prepare a saturated solution of Wright Stain (dry powder) in denatured alcohol (95%). Immerse *air-dried* unknown sample into boiling Wright Stain solution and boil for a few seconds. Rinse the sample thoroughly in cold water.

Viscose Process rayon is stained blue by this treatment.

Cuprammonium Rayon is stained violet.

(b) *Schreiber-Hamm (Sulfide) Test:*

This test is suitable only for raw rayon of standard manufacture. Certain experimental yarns and processed yarns cannot be positively identified by this test.

A five-gram sample of the unknown Rayon (Viscose or Cuprammonium) is placed in a flask together with 100 cc. of water and 3 cc. concentrated sulfuric acid. The mouth of the flask is covered with a piece of lead acetate paper and allowed to stand on a moderately boiling steam bath for four hours.

If the sample is Viscose Process Rayon, the lead acetate paper will be stained brown or black.

If the sample is Cuprammonium Rayon, no discoloration should be observed.

(5) Identification of Undesulfurized Viscose Process Rayon

The difficulty of visually distinguishing between some delustered rayons and undesulfurized Viscose Rayon has sometimes led to confusion and improper Rayon Identification.

Undesulfurized Viscose Process Rayon can be readily identified by means of sodium plumbite solution.

Preparation of Sodium Plumbite Test Solution:

(1) Dissolve forty grams lead nitrate in 200 cc. of warm water.

(2) Dissolve seventy grams of caustic soda in 300 cc. of water.

(3) Add the caustic soda *solution to* the lead nitrate solution.

(4) Filter.

(5) Dilute to two liters.

Method of Testing

A small quantity of the solution prepared as above is brought to the boil. The unknown Rayon sample is inserted into the boiling test solution for a period of one-half minute.

Undesulfurized Viscose Process Yarn turns black.

Incompletely Desulfurized Viscose Process Yarns are turned black, dark brown, or medium brown, depending on the degree of desulfurization.

Desulfurized Viscose Process Yarn is stained a brownish yellow color.

When possible, check tests on known samples should be run simultaneously with the test.

Microscopic Identification of Rayon

As rayons are most easily, quickly and positively identified by means of a microscopic examination, we recommend that this method be used whenever possible.

A microscopic examination of rayon is very simple and can be successfully carried out by men previously unfamiliar with the use of the microscope after a few hours' practice.

For the benefit of those unfamiliar with the microscope and its use, we are pleased to describe the cheapest type of microscope that is, in our opinion, suitable for the microscopic examination of rayon. The analyst will need:

1. Microscope Stand and Lenses.

The instrument should be capable of magnifying to 400 diameters.

Suitable apparatus can be obtained from Bausch & Lomb, Outfit No. FFS6.

A similar type of apparatus can be obtained from Spencer Lens Co., Outfit No. 44F.

The cost of this apparatus is approximately $90.

The above combination includes achromatic objectives, 16 mm. and 4 mm., eye piece 5x and 10x; and Abbe condenser N.A. 1.20.

2. Microscope Lamp.

Suitable apparatus can be obtained from:

Bausch & Lomb

Lamp—Catalogue No. 4597-C

Ground Glass—Catalogue No. 4579

Spencer Lens Co.

Lamp—Catalogue No. 370-B.

The cost of this apparatus is approximately $24.00.

3. Microscope Slides and Cover Glasses.
4. Mounting Medium.

   Methylene Iodide, or Monobromnaphthaline.
5. A piece of thin glass rod.
6. A small scalpel or sharp knife.

We wish to point out that while the simple basic microscope recommended here is sufficient to successfully analyze an unknown rayon specimen, the usual accessories, such as a mechanical stage, measuring devices, and polarized light equipment, may always be added when found necessary for work of a more comprehensive nature.

Naturally, it is advantageous to have a more elaborate type of instrument, such as is usually employed for research in investigations, and when the means are available and the investigator sufficiently adept in the use of the microscope, we recommend that this type be obtained.

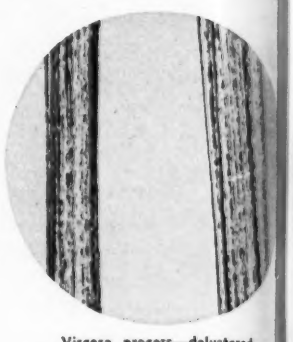
Lateral Method of Fiber Identification

The lateral method of fiber identification is preferred by the Rayon Sub-Committee because of its simplicity.

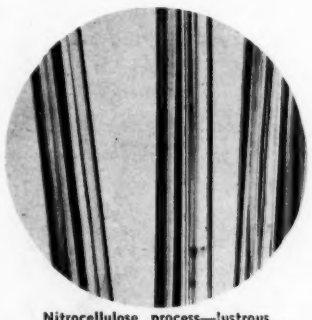
Procedure:

1. Separate individual filaments of the unknown sample.
2. Place yarn on microscope slide.

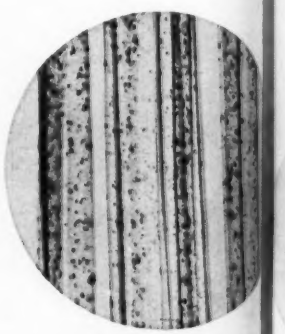
Viscose process—lustrous.
Note lengthwise striations.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.



Viscose process—delustered.
Note lengthwise striations.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.
Note globules of oil.

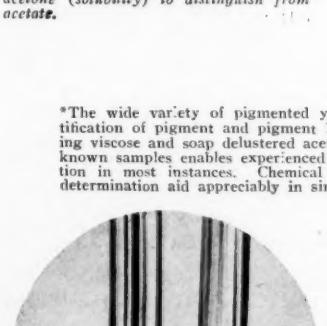


Nitrocellulose process—lustrous.
Note absence of striations.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.

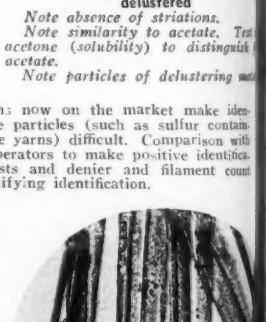


***Nitrocellulose process—pigmented delustered**
Note absence of striations.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.
Note particles of delustering matter.

*The wide variety of pigmented yarns now on the market make identification of pigment and pigment like particles (such as sulfur containing viscose and soap delustered acetate yarns) difficult. Comparison with known samples enables experienced operators to make positive identification in most instances. Chemical tests and denier and filament count determination aid appreciably in simplifying identification.

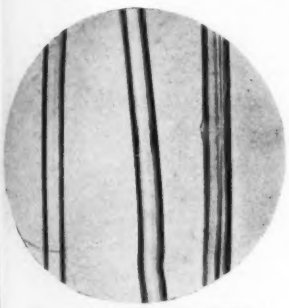


Cellulose acetate—lustrous
Note absence of striations.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.



***Cellulose acetate—delustered (soap).**
Note absence of striations.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Note globule-like formation on rayon.

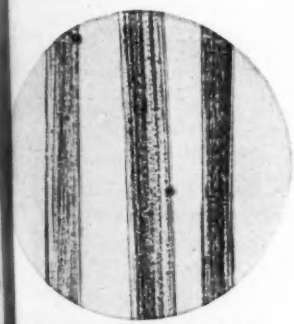
*The wide variety of pigmented yarns now on the market make identification of pigment and pigment like particles (such as sulfur containing viscose and soap delustered acetate yarns) difficult. Comparison with known samples enables experienced operators to make positive identification in most instances. Chemical tests and denier and filament count determination aid appreciably in simplifying identification.



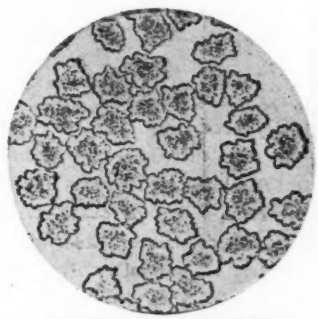
†Cupra-ammonium process—lustrous.
Note absence of striations.
Note size of filaments.
Apply Millon Test to distinguish from real silk.

Real Silk.
Note absence of striations.
Note size of filaments.
Note slight irregularities within individual filaments.
Apply Millon Test to distinguish from cupra-ammonium process rayon.

†Note.—Certain of the newer staple fiber and fine filament viscose process rayons resemble cupra-ammonium to a certain extent microscopically. Careful examination and comparison with known samples enables experienced operators to positively identify unknown samples in most instances.



*Viscose process—undesulphurized.
Note lengthwise striations.
Note particles of precipitated sulfur.



*Viscose process—undesulphurized.
Note particles of precipitated sulfur.
Note irregular serrated edges.

*The wide variety of pigmented yarns now on the market make identification of pigment and pigment like particles (such as sulfur containing viscose and soap delustered acetate yarns) difficult. Comparison with known samples enables experienced operators to make positive identification in most instances. Chemical tests and denier and filament count determination aid appreciably in simplifying identification.

3. Apply a drop of the mounting medium to the yarn and slide.
4. Place cover glass over yarn and mounting medium.
5. Press cover glass gently with a glass rod until mounting medium covers over the entire under side of the same.
6. Place slide on microscope stage.
7. Light microscope lamp and focus beam from same up through sample.
8. Focus microscope and observe sample.
9. Compare unknown sample with photomicrographs accompanying this report.

Cross-Sectional Method of Fiber Identification

Some analysts prefer the cross-sectional method of rayon identification. Others use it as a confirmatory method.

Of the many methods of preparing cross-sectional mounts that are in general use today, we prefer the Schwarz sectioning plate (perforated slide) method. Other methods, for example, the cork method, will give equally good results in the hands of skilled operators.

In addition to the apparatus required for making lateral examinations, the cross-section method of Rayon Identification requires the use of a Schwarz sectioning plate (obtainable from Spencer Lens Company or Bausch & Lomb) and a sharp blade; for example, a safety razor blade of the Gem type (guarded back).

Procedure:

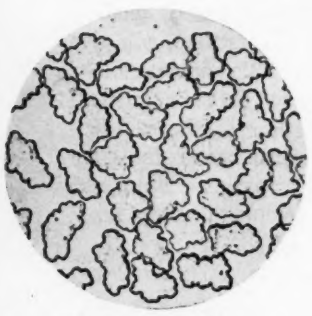
1. Form a small skein or bundle of yarn (two or three inches long) from the unknown sample.
2. Insert one end of the small skein or bundle of yarn into an opening of the sectioning plate and pull through until the mass is held firmly.
3. Cut the entire mass as closely as possible to the plate. The cut should be made with a single stroke, sliding the blade rapidly and diagonally, in contact with the surface of the plate through the mass of fibers as pressure is applied. A *sharp* (safety) razor blade must always be used.
4. Place sectioning plate on microscope stage.
5. Examine with transmitted light (light thrown up through sample from mirror underneath the stage), using a 16 mm., 8 mm., or 4 mm. objective and a 5 or 10x ocular according to the power of the light used and the magnification desired. Daylight can be advantageously used only with the lower magnifications.
6. Focus the microscope and compare with the photomicrographs accompanying this report.

The Committee calls special attention to the delusterants that are now added to certain brands of all types of synthetic fibers. These delusterants vary in microscopical appearance and can be identified by experienced investigators possessing representative samples of the commercial yarns.

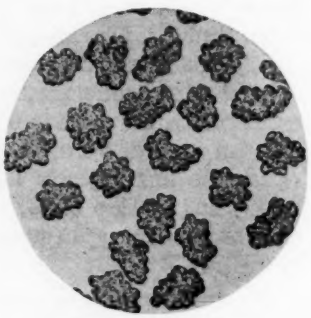
Inexperienced investigators cannot expect to successfully identify the type of delusterant used, and must use especial care when examining dull yarns. It is recommended to combine microscopic examination with chemical tests and filament count and denier determinations.

The Rayon Committee wishes to state that, in its opinion, the electroscope (an instrument that is reputed to identify Rayon yarns by measuring the difference in static capacity) is unreliable as a means of identifying rayon.

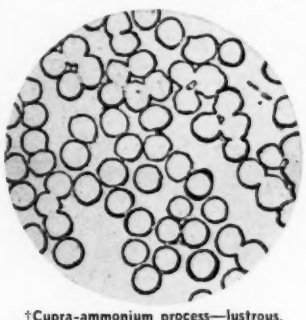
The Rayon Sub-Committee is of the opinion that colorimetric tests while of value in certain specific instances, are unreliable as a means of positively identifying all samples of rayon.



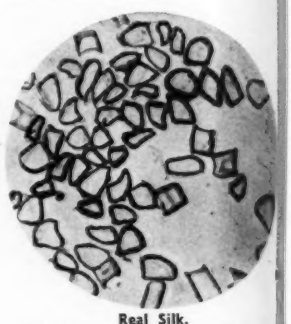
Viscose process—lustrous.
Note irregular serrated edges.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.



Viscose process—delustered.
Note irregular serrated edges.
Note—There is an appreciable variation in the appearance of viscose rayon produced by different manufacturers.
Note globules of oil.

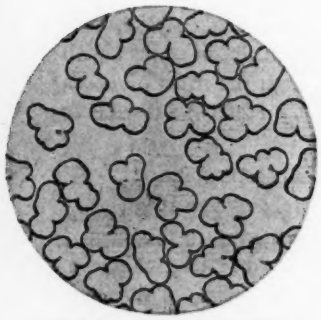


†**Cupra-ammonium process—lustrous.**
Note relatively smooth edges.
Note shape and size of filaments.
Apply Millon Test to distinguish from real silk.



Real Silk.
Note edges—relatively smooth but less regular than cupra-ammonium.
Note shape and size of filaments.
Apply Millon Test to distinguish from cupra-ammonium rayon.

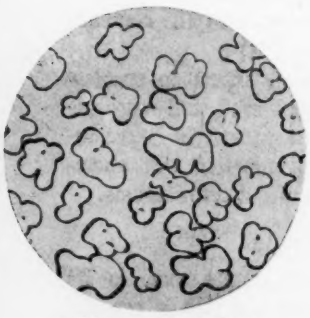
†Note,—Certain of the newer staple fiber and fine filament viscose process rayons resemble cupra-ammonium to a certain extent microscopically. Careful examination and comparison with known samples enables experienced operators to positively identify unknown samples in most instances.



Nitrocellulose process—lustrous.
Note relatively smooth edges.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.

***Nitrocellulose process—pigment delustered.**
Note relatively smooth edges.
Note similarity to acetate. Test with acetone (solubility) to distinguish from acetate.
Note particles of delustering materials.

*The wide variety of pigmented yarns now on the market make identification of pigment and pigment like particles (such as sulfur containing viscose and soap delustered acetate yarns) difficult. Comparison with known samples enables experienced operators to make positive identification in most instances. Chemical tests and denier and filament count determination aid appreciably in simplifying identification.



Cellulose acetate—lustrous.
Note relatively smooth edges.
Test with acetone (solubility) to distinguish from nitrocellulose process rayon.

***Cellulose acetate—delustered (boiling soap).**
Note relatively smooth edges. Test with acetone (solubility) to distinguish from nitrocellulose process rayon.
Note globule-like formation within rayon.

*The wide variety of pigmented yarns now on the market make identification of pigment and pigment like particles (such as sulfur containing viscose and soap delustered acetate yarns) difficult. Comparison with known samples enables experienced operators to make positive identification in most instances. Chemical tests and denier and filament count determination aid appreciably in simplifying identification.

The above described methods of analysis will differentiate between the four chemical types of rayon as offered to the trade during 1931. The Rayon Committee calls careful attention to the fact that all rayon companies are today producing small lots of various experimental yarns that are distributed to fabric manufacturing mills for practical tests. Samples of these experimental yarns are sometimes sent to plant chemists for identification. Obviously, the above described tests may not successfully identify all special experimental yarns.

We also wish to state that, with certain exceptions, it is, in our opinion, impossible to positively identify trade brands of rayon produced under any particular process.

ANALYTICAL METHODS
FOR A
TEXTILE LABORATORY

By Walter M. Scott

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Proceedings of the American Association of Textile Chemists and Colorists

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive

Note. Persons who have obtained employment should notify the secretary at once. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-2

Education—B.T.C., Lowell Textile Institute, 1932; also course in typing.

Experience—None to date, interested in quantitative analysis, experimental dyeing, color matching, dye testing and dye identification. Ability to learn quickly and will go anywhere. 23 years old, woman, single.

A-5

Education—B.T.C., Lowell Textile Institute.

Experience—Assistant chemist in carpet mill, dye tester in dye plant, research and analytical work in silk dyeing and finishing plant laboratory, plant chemist and overseer of bleaching in surgical dressing plant, assistant chemist in woolen mill. Age 29. Married.

A-6

Education—Analytical chemistry and dyeing course at Lowell Evening Textile School.

Experience—Three years as print chemist and one year as dye chemist for large print works. Two and one-half years as plant chemist for dyeing, bleaching, printing and finishing plant.

A-B-2

Education—Lowell Evening Textile School, 1917.

Experience—Five years' experience in hosiery dyeing, full fashioned hosiery of silk and cotton and silk, also men's hosiery containing rayon, wool, cotton and celanese. Several years experience in laboratory work. Has also had experience in jig-dyeing of cotton piece goods, slub and top dyeing.

A-B-C-1

Education—Graduate Industrial Chemical Engineer, Pratt Institute—1911.

Experience—One year as plant control chemist, 4 years as laboratory chemist with gas company, 13 years as plant chemist with bleaching, dyeing and finishing plant. (Rayon and cotton piece goods). Formulated processes and put them into plant operation, 1 year as chemist and demonstrator for dyestuff company, 1 year as superintendent colorist with print works printing linen and rayon, 1 year as director of testing laboratory for national dry goods concern.

A-E-2

Education—B.T.C., Lowell Textile Institute, 1933.

Experience—Assistant instructor in chemistry, Lowell Textile Institute. Member of scholastic honorary fraternity.

A-E-1

Education—Ph.D., Univ. of Illinois, studied chemical engineering at Columbia, licensed chemical engineer, New Jersey.

Experience—10 years' experience teaching in colleges, subjects included chemical and textile subjects. Has had broad experience in industrial work including experience in testing materials, research and consulting. Will go anywhere; references.

B-1

Education—Educated and trained in chemistry and calico printing in Glasgow, Scotland.

Experience—Has been with large print works as colorist for 13 years producing first class work on cotton, rayon, wool and silk fabrics. References.

B-2

Experience—Boss dyer with one firm for 18 years, divisional supt. at print works for 1 year, in charge of processing and dyeing of cottons and rayons at large bleachery for 6 years. Prefers bleachery in East but will go anywhere. References.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following; celanese, rayon, cotton lacks, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-6

Education—Graduate R. I. School of Design.

Experience—5 years in bleachery, 7½ years as assistant dyer, 2 years as boss dyer and 3 years as superintendent of dyeing and finishing. Married, 33 years old. References.

B-7

Experience—Eight years as boss dyer on skeins and ribbons. Over ten years as chemist and head dyer for a large hosiery mill. Experienced on Silk, cotton, rayon and wool in skeins, ribbons, piece goods and all kinds of mixtures. Willing to go anywhere. Not afraid to work or face responsibility. Can handle help efficiently.

B-8

Education—Chemistry and Dyeing Department, Philadelphia Textile School.

Experience—Eleven years experience as chemist and boss dyer on the following: woolen, worsted and cotton yarn; woolen, worsted and union piece dyes on both ladies' and men's wear; wool, cotton, shoddy and mohair raw stock. Age 33, married, will go anywhere. References.

B-9

Experience—Hosiery dyer with fifteen years' experience on high grade silk hosiery; familiar with all types of machines. Age 43, married. Will go anywhere.

B-12

Education—2 years days at N. Y. U. and 3 years nights studying chemical engineering.

Experience—1½ years asst. colorist, 5½ years colorist. Experienced on vats, commercial and fast colors on cotton and cotton-rayon mixtures. References; age 29; married.

B-13

Experience—Large experience as an assistant colorist chemist in silk printing, dyeing and finishing; also on cotton and wool dyeing. References.

B-14

Education—Rhode Island School of Design.

Experience—Familiar with all classes of wool dyeing. Seven years with large carpet mill as dyer and processor of washed oriental rugs. Will go anywhere, married, 37 years old. References.

B-15

Education—B.T.C., Lowell Textile Institute, 1934.

Experience—Experience in dye house running washers, dye kettles and as a dye weighter.

F-1

Education—Textile Institute, Alexander Hamilton Inst., Extension work at Brown Univ., working knowledge of German.

Experience—Has had executive departmental work with all types of textiles manufacturers. Acquainted with all types of textile machinery, dyestuff application, laboratory practice, cost methods, and checking methods and processes. References.

AMERICAN
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REPORTER

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MR. GREEN SPEAKS

WILLIAM GREEN, president of the American Federation of Labor, occasionally makes some rather peculiar statements,—peculiar in that they seem to show a lack of certain qualifications that he ought to possess in view of the important position which he holds. Recently he complained that our private industrialists were lacking when it came to increasing employment and went on to say: "Surely our industrialists cannot confess that the problem of unemployment has them licked. If they capitulate, now that the bankers, too, have shown their incapacity . . . will it be necessary for society to take over the means of production?"

On reading the above statement one would take it for granted that all that is needed is for our employers to take on more men, manufacture more goods and dump them on the market without reason, and trust to God. If we could get away with such a procedure and still get paid for our goods our worries would be over, but unfortunately we have to consider how much of the goods produced can and will be absorbed. It is quite easy to understand that every employer would be eager to expand, increasing production and hiring more men if he had orders to fill. Mr. Green goes further and indicates that present unemployment is the fault of our industrial leaders. Commenting on this the *New York Times* states editorially: "The folly of such a belief would become evident to him if he merely examined unemployment by special industries instead of in the lump. Such an examination would show that men are dropped only when demand for a particular product has dropped, and added where demand for it has increased. The United States Bureau of Labor Statistics finds that employment in all industries in April of this year was on the average 82.3 per cent of that in the 1923-25 period. But this does not mean that employers generally, through some perversity or irrational fear, had simply let off 17.7 per cent of their men. For while in locomotive manufacture employment had dropped to 25.3 per cent of the 1923-25 level, in aircraft manufacture it had risen to 395.8 per cent of that level. While it had fallen to 34.3 per cent in sawmills, it had increased to 319 per cent in the rayon industry.

"When Mr. Green says that there is 'a steady demand for goods' he is saying something that simply is not so. There has been only a moderate decline in the demand for goods for immediate consumption, but a very severe decline in the demand for capital and other durable goods. It is here that the large pockets of unemployment exist. It is a problem not created by industrial leaders alone, and cannot be solved by them alone. One cannot take an increasing number of powers—over wages, hours, production, prices, security issues—out of the hands of industrial leaders and then hold them solely responsible for the result."

When Mr. Green asks if it will be necessary for society to take over the means of production we wonder exactly what he means by the term *society*. Does he mean the government? President Roosevelt's government has already taken over the means of production,—taking charge of industries, payrolls, shops, farms, and spending billions of the public money in an effort to restore prosperity by artificial methods. Evidently he must mean a group other than the government then—either unruly mobs or organized labor unions. Such a leadership would result in unbridled revolt. Whether that is the best method to bring back prosperity or not we will leave up to you. We think our industrial leaders have more ability than Mr. Green gives them credit for and we shall not be surprised to see this demonstrated.

Perhaps Mr. Green represents the labor unions but whether he voices the beliefs of all workers is another matter. Decent labor knows that it cannot get something for nothing and also knows that the mill owner cannot continue to take a loss forever in producing goods that have no market. Many mill owners have continued operations at a loss merely to give their employees enough money to live on and when told that they are at fault for not hiring more people to reduce unemployment it is a little too much to expect them to accept in good faith such statements as Mr. Green's.

● SILK PARADE

A "Preview of the Silk Parade" was released recently (July 24th) to those who will take part in it. It was sent to merchandise heads, buyers, manufacturers, department store heads, silk mills, the cutting-up trade and the trade press. It is a twenty-four page booklet summarizing preparations for the September silk promotion which will be held the week of September 10th in New York and the week of September 17th nationally.

A limited number of books have been spiral-bound for the use by the trade in their showrooms and by their salesmen in store contacts. Copies of the "Preview of the Silk Parade" will be supplied without charge on request to the International Silk Guild.

The booklet contains many helpful suggestions to the retailer for promotional tie-ups, advertising copy and design, and the reasons for consumer interest, what the Parade will do for the trade, what it will do for the stores and how the retailer can best capitalize on genuine silk.

● DYE PRODUCTION INSUFFICIENT

Development of the Soviet Republic's coal tar dye industry has not been as rapid as anticipated and as yet has been unable to supply the demand from textile, leather, fur, cotton, and other domestic industries, according to the Soviet journal "For Industrialization," just received in the Commerce Department. For the past two years dye production has been only 57 per cent of the quantity needed in spite of heavy investments by the Government in the construction of plants and otherwise.

Production during the first quarter of 1934, however, was slightly ahead of schedule, both in quantity and value, for the first time in several years. The 1934 program calls for a number of new intermediates, hitherto not produced in the Republic, and 20 new dyes.

The Journal states that while the amount of dyes turned out in the first quarter of the year was higher than schedule, much development work must ensue as the range of colors is not wide enough and the quality of some is far from satisfactory. It is anticipated that the domestic coal tar dye industry will be able this year to cover up to 89 per cent of the demand from all divisions of light industry that use dyes, assuming an increase as expected in certain of the important types.

Several important dyes are not being manufactured at present and must continue to be obtained abroad, and there is also a shortage of many new materials.

● FALL 1934 MILLINERY COLORS

The Official Millinery Color Conference Committee and the Textile Color Card Association have made the eighteen color recommendations listed below for the 1934 Fall season, it was announced recently.

In selecting these shades, the committee gave careful attention to the basic costume colors which are expected to prove outstanding in the Fall mode.

New renditions of brown are strongly emphasized in this millinery group as having high merchandising value. These comprise Malacca Brown, a new rich chestnut type, Spanish Sherry, an animated light brown of cedar cast, Rose Mahogany, a warm slightly reddish brown, Leafdust, a smart light cocoa shade and Jaffa Brown, an important neutral tone.

Closely allied to the browns are new versions of rust, which is slated to repeat its popularity of the past Winter. Leafrust suggests the rich tone of Autumn foliage, while Clayrust is a lively darker shade of reddish cast.

Greens, which are expected to win increased fashion favor as the Fall approaches, are represented by Stroller Green, a high style tone of bluish cast, Scottie Green, of yellower undertone, and Cedagreen, a neutral greyed shade of dark value.

Bordeaux Wine and French Claret are rich bluish reds included in the Fall millinery group. Black Cherry is a subdued purplish tone of high fashion value. Treetaupe, the smart version of eucalyptus grey, and Winter Grey, a neutral medium shade, also appear in the selection. In the blue range for early Fall wear are Yachtsman, a clear nautical tone, Nightblu, a dark navy and Bleu Militaire, a high fashion greyed blue.

All of the above shades have been chosen from the 1934 Fall Silk and Woolen color collections already issued in confidential form by the Textile Color Card Association to its members.

● TEN SCHOLARSHIPS

To the ten best students of textiles throughout the United States, The Traphagen School of Fashion is offering Scholarships which will cover one-half of the student's tuition at the school. These scholarships will be given for an eight-month period of study, but will be extended to twelve months should the student display enough ability.

The idea of granting scholarships covering only one-half of the tuition is to place some financial responsibility on the student, thereby obtaining better results and more perfect cooperation on his part.

Applicants, either boy or girl of any age, for these scholarships should be recommended by their previous school, instructor, or employer, and must submit samples of their work to the Textile Committee of The Traphagen School of Fashion, 1680 Broadway, New York City, for consideration.

Preparing Methods and their Importance

By G. L. ATKINSON

THE finishing of dress and coating fabrics of all types calls for a high degree of skill and care, nowhere more so, than in the actual preparing and finishing processes. It will be noted that dyeing has been omitted, but it should be remembered that the dyeing operation has little or no effect upon the final finish and handle of the cloth.

It is to be regretted that the textile industry has not progressed as a whole as others have done. It is no exaggeration to say, that in the textile industry today, apart from the key men, such as the dyer, finisher, foremen, etc., the standard of knowledge or education is very low. It might be asked what this has to do with preparing or any other methods, yet the fact remains that there are very few men who possess an all round knowledge, and not just of their own particular job or process.

Lack of co-operation and foresight of those responsible is often the cause of badly or indifferently finished goods. Co-operation between the preparer, the dyer and the finisher is not only essential but vital, for increased efficiency and the standard of work turned out being maintained. At present there is far too much aimless work carried out with little or no object.

It has as yet scarcely been realized that the preparing processes are vital with regard to the handle and finish of any cloth. To go a step further it is necessary to say that the preparing processes determine both the handle of the fabric and the type of finish achieved upon it. This is a point that very few firms recognize. It should always be remembered that the actual finishing processes are of little or no help in the finish or handle of a cloth, and in point of fact are utterly useless if the preparing methods have not been correctly carried out.

With the exception of such definite types of finished goods as velours, etc., most firms do not consider that the preparing processes have any importance except in the fabric being perfectly clean for the dyeing operation.

That the preparing operations are not only important but are vital with regard to the finish and handle of the goods may be judged from the fact that it is possible to scour a cloth perfectly clean, entirely free from faults in the dyeing operation, yet the same cloth will be deficient in finish and handle, and no amount of skill in the finishing processes will remedy the matter. This well illustrates the fact that the preparing processes actually determine the handle and finish of a cloth and that the finishing processes merely assist the effects obtained during the initial preparing.

The crabbing operation is probably the most important operation in the whole of the preparing, dyeing and finishing of any cloth, yet it has not received a great amount of publicity and in many concerns even today, though one often wonders why, this operation is carried out as a kind of secret ritual, and often the management are not aware as to what actual processes to which the cloths are subjected. Crabbing of a cloth is generally carried out today, with the majority of the lighter weight dress goods, this being done in order that the cloths shall be perfectly "set" when finished, or that no cockling or crimping is evident in the goods. This is a straightforward operation, the only things that can be changed here are the tension applied to the pieces and the number of bowls that the pieces are crabbed in; i.e. one, two or three bowls. This means practically that the cloths will be either heavily or lightly crabbed, according to the tension and the number of bowls they are passed through, yet this has little or no effect upon the actual finish and handle.

Often the crab is equipped with topweight apparatus and here the first sign of the importance of the preparing operations is shown. The topweight apparatus is or should be used during the crabbing of goods which contain a woolen weft, and effectually softens the handle of the goods and in addition stops the cracking and bursting of the woolen weft, a fault which this type of cloth is very apt to develop. This fault is sometimes caused during scouring, through the temperature of the scour becoming too high and the goods not being held under tension in either width or length, but it is more frequently caused in the dyeing of such goods, when the same reasons as in scouring are the cause of the fault. No amount of skill in finishing can remedy or even cover over this fault once it develops, and the whole trouble can be avoided if care is exercised during the preparing of the cloth as mentioned; this being a case of where the cloth can be correctly prepared for dyeing and also for

finish, yet well illustrates the importance of the preparing operations.

The next operation on the crab is that of steaming, here there are several points to be noted that are not apparent upon a superficial examination of the process. Goods are generally steamed upon the crabbing machine for two entirely distinct reasons, both of which well illustrate the importance of the preparing operations. 1. Goods are steamed for avoidance of faults such as cracking, or cockling, as evidenced in the majority of repp and poplin fabrics. 2. Goods are steamed in order to secure some beneficial effect in the final handle of many cloths.

In the first place the goods can be quite correctly prepared for dyeing, but if such cloths as poplin and repp fabrics are not steamed during crabbing it is very rare that these cloths do not crack or crimp during the dyeing operation. With regard to the final handle of cloths and the process of steaming, this is often carried out to obtain a softening in the final handle. This is commonly practised with the majority of cross bred cloths which will withstand the preliminary crabbing operation. A cross bred serge piece is always harsh to handle if it is not steamed during crabbing, and the difference in the final handle between two cross bred pieces of the same quality, one of which has been steamed and the other not, is to say the least, considerable. Here again, in both instances the goods are correctly prepared in that no faults will occur during the ensuing processes such as dyeing or finishing, but the results vary widely when the goods are finished. In addition no amount of skill and trouble in finishing can make an unsteamed piece as soft in handle as one that has been steamed during the crabbing process. Nor can the effect be obtained if the unsteamed piece is returned for steaming when it has passed through the finishing room and has not been found satisfactory.

This same process is often utilized for obtaining a fuller handle than is the case when the cloth is unsteamed. Many pieces can be subjected to this process with benefit, because here the action of the steam causes the fibers to swell up to a certain point, this having the same effect upon the cloth as the damping or dewing operation in finishing; that is, the wool fibers of the fabric are allowed to "regain." This has the effect of creating a fuller handle when the goods are finished than would be the case if this operation were to be dispensed with, and it cannot be obtained by any other means.

It should be noted that in all the foregoing cases, it has been assumed that the finish of the cloths is clear cut straight finish.

To take the cases of other cloths which are required in a variety of finishes, such as heavy coatings for contract cloths, or army or navy service cloths, which generally require a slight amount of cover as part of their particular finish, and such cloths as velour fabrics which are required in a milled and semi-milled finish, or face cloths which are required in a milled or raised finish. It will be noted that all these cloths are required in a definite type of finish, but not handle.

Very little effect is found upon either handle or finish in the scouring of the majority of dress goods, the main object here is to see that the goods are perfectly clean for the dyeing operation, and apart from several faults that arise during this operation, there is little to be said, except that with the majority of dress goods it is very difficult to obtain any cover worth speaking of upon the fabric, either by milling or raising, owing to the construction and materials used in the cloths. Also with regard to the scouring of these cloths, it is very difficult to obtain any effect with regard to their finish and handle due to the fact that they are not of robust construction, as are the heavier types of coating fabrics and as such cannot withstand any prolonged scouring. With these types of cloths the effects with regard to their finish and handle have to be obtained upon the crabbing machine.

With regard to the heavier types of cloths, scouring is carried out for both handle and finish, in some cases both. It often occurs that a customer submits a pattern for finish of a coating fabric that has some cover on it. Often the cover is not sufficient to justify the milling of the cloth, this has to be gained during the scouring of the fabric. Not only is the effect upon the cloth gained in this case, but it will be noted that where double scouring is employed that the handle is much fuller and firmer when the goods are finished.

In the milling of goods, the first scour is usually the soaping scour for the milling of the goods, and in many cases no more attention is paid to the final scour after the goods have been milled, other than to see that the pieces are free from soap or other materials in readiness for the dyeing operation. Here the handle of the goods is often impaired, it should be remembered that the handle of the goods when finished is just as important as the finish of the goods during the actual milling of the cloth.

Scouring, speaking generally, should not be looked at merely as a means of cleansing the cloth, but should be carried out with two points in mind, the finish and the handle of the cloth. If the finish is clear straight cut, etc., then there is only one point that requires attention, namely the handle of the fabric, and the scours should be devised to give the best possible results from this point of view. The cleanliness of the fabric, while important with regard to the dyeing operation, should not be the end all of the scourer's vision, or the management's either for that matter.

For example ammonia is a welcome addition to any scour, not only in colored fabric does it result in the design colors being bright and clear after the operation has been carried out, but it results in a thorough searching of the fabric. Yet the use of this scouring material often results if nothing else in a harsh handle being imparted to the cloth. It will be found however, that by a suitable arrangement of the scour that this fault can often be

eradicated. Obviously the materials used in the scour are important in connection with the times which are allotted to each portion of the scour, such as the cooling down or washing off times, these being quite capable of affecting the handle of the cloth to a remarkable degree.

The same reasons apply to both the raising and milling operations, here the cloth is treated from two points of view, the first being for obtaining a definite effect upon the cloth as in the case of velour fabrics, or in the trailing or brushing of the fibers all one way as in the case of certain novelty face cloths. The second reason applying to these two processes, that raising is often attempted to obtain a very slight cover upon the cloth, this assisting considerably in the impression of a full handle when the goods are finished. Slight milling can be practised on heavy coating cloths to obtain a softening in the final handle, no definite effect in this case being attempted, with regard to the matter of finish.

From the foregoing facts it will be evident that the preparing operations are not only important but vital with regard to the final handle of the cloth. This is a fact that should be more readily appreciated than it is at present, and the preparing operations should not be merely taken as a means of cleansing of the cloth. It can be definitely stated that a cloth can be made or marred during the preparing operations and the finishing processes are powerless to remedy the defect.

• GOOD SHOWING

Faced with severe handicaps, Germany's export trade in chemical products made a relatively good showing in the first quarter of 1934, according to a report from Consul Sydney B. Redecker, Frankfort-on-Main, made public by the Chemical Division Department of Commerce.

The value of chemical exports during the first quarter totalled 176,444,000 marks compared with 174,933,000 marks for the corresponding period of 1933. That this showing was not made without vigorous effort is indicated by the fact that the volume of exports increased from 658,000 to 819,000 tons, an increase of 29 per cent in volume while the value advanced by less than 1 per cent.

The trend for chemicals to assume a greater importance in Germany's total exports, noted during recent years, continued in 1934, and represented 16.1 per cent of the total compared with 14.7 per cent in the first quarter of 1933.

German chemical manufacturers continue to complain bitterly about the difficulties of carrying on a remunerative export trade, stating that in addition to the high import tariffs, exchange controls, and quotas, the depreciation of foreign currencies has created a devastating competition.

New developing production in various countries, notably Japan, supplying not only an increasing share of their own domestic consumption but entering into competition increasingly with German products in third markets, is a further adverse factor. However, in this connection the system of registered marks and scrip made available by the thawing out of foreign frozen debts in Germany and re-purchase by Germany of German foreign bonds, has doubtless considerably assisted Germany producers in meeting the increased foreign competition caused by foreign currency depreciation.

Unfortunately, no accurate data are available showing the extent to which the competitive position of individual German chemical products destined to exportation or, for that matter, the chemical export trade as a whole, has been supported by the application of registered marks.

The difficulties of securing payment for exports through unfavorable financial conditions in countries otherwise favorable to the purchase of German chemical products have conduced to the more extensive development of the system of international barter. This system received great impetus during the last year, and particularly the last quarter, German chemical concerns resorting to this method in a number of important instances as a means of carrying on their export trade, particularly in the financially distressed States of Southeastern and Northeastern Europe not provided with an important chemical production and therefore offering important chemical import markets, while at the same time being in a position to furnish various raw products needed by Germany.

Most of the leading German chemical exports to the United States showed substantial increase this year, a remarkable showing considering the augmented difficulties of German producers in meeting competition in the American market. However, the trade trend varied considerably according to the individual product, and there were notable cases of decreased American purchases, although such decrease as occurred were greatly offset by gains for the general run of products.

• WORLD CHEMICAL SURVEY

A world survey of chemical and allied products developments, entitled "World Chemical Developments in 1933 and Early 1934," has just been released by the Commerce Department, according to advices from C. C. Concannon, Chief of the Commerce Department's Chemical Division. This booklet, a copy of which we have examined, consists of 84 pages, covers 27 countries, and is prepared in large part from material supplied by Consuls and Trade Commissioners stationed in the various countries dealt with. The full range of chemicals, dyes, drugs, proprietary medicines, toiletries, paints, fertilizers, and allied products is covered in the bulletin. This booklet may be obtained at a cost of 10 cents from the Superintendent of Documents, Washington, or from any of the Bureau of Foreign and Domestic Commerce District Offices, located in principal cities throughout the country.

Technical Notes From Foreign Sources

Stability of Raw-Mercerization Liquors

Dr. H. Friedrich—Monats. F. Textile—Ind. 47,254 (1932).—The subject of mercerization is one of the most interesting, in consideration of the new methods and concepts which have, in recent years, led to improvement in results, or savings in labor or time. The possibility of mercerizing raw cotton goods without the need of kier-boiling is not to be regarded as merely a permissible shortening of the time-factor and the decreasing of costs, but as also involving an improvement in the quality of the product, whose elasticity and weight suffer loss through kier-boiling. The first requirement for the raw mercerization is the use of a caustic liquor which, through addition of certain assistants, brings about an increase in shrinkage as great as possible, and complete mercerization. Such additions, which are recognized in ordinary mercerization as protective agents, must fulfill certain requirements, which narrow the field considerably in choice of the best available. The value of such additions depends upon their ability to bring about a more rapid penetration of the goods by the caustic, by decreasing the surface tension at the cotton fiber-caustic liquor junction. The entrance of the liquor into the fiber brings about a powerful shrinkage. Since the total effect is a function of the shrinkage, it is logical to draw a conclusion as to the mercerizing power of a given liquor, and the activity of the assistant used, from the speed and extent of the shrinkage.

The ideal mercerizing liquor must be stable as to its NaOH content, in all concentrations which may be required, must be and must remain clear, and must not tend to form or retain froth. The chief requirement is, that its action remain reasonably constant, not that is possess a high reactivity. In raw mercerization, an ordinary liquor is often observed to lose its activity to a certain extent, not only after use, but even sometimes by standing before being used at all. Loss of activity during use of course points to too strong absorption by the goods. When different lots of goods, which are to be subjected to subsequent dyeing by the same process and dyestuff, are mercerized successively in an unstable bath, a lot mercerized during the forenoon, and another mercerized in the afternoon, of the same day, in the same liquor, will frequently show a serious difference in color-tone, even when dyed together in the same dyebath.

The author has carried out comparative experiments in raw mercerizing, employing commercial preparations of two types (sulfonated oil type and phenol derivative type) as assistants in the caustic bath. The tests were carried out under parallel and exact conditions, in order to make possible the assignment of numerical, quantitative values to the results. Concentrations of 32°, 30°, and 25° B. were employed for the caustic, and the amount of assistant was 5 g. per liter. It was found that shrinkage was greater with the weaker liquors, and that the action of the compound bath was so rapid that the shrinkage was visible even while taking place. The sulfonated oil type of assistant was the more active of the two, and maintained the activity of the caustic over a longer series of experiments.

One table of quantitative values is given.

Vat Dyestuffs and Intermediates

German Patent No. 463,001 (*20/VII/'23*) (*addition to G. P. No.* 445,280 *of* 20/*V*/'23) *Gesells. f. Chem. Ind. in Basel.*—A development of the line followed in the original patent. Betanaphthothiofurane-1-2-dione is prepared by hydrolyzing the corresponding anils or halogen derivatives of it, and is then condensed, according to the original patent, with cyclic compounds which contain a reactive methylene group. The products obtained may then be halogenated (e.g., resulting in the formation of *2-3-2'-3'*-bis-naphthothionaphthalene-indigo).

Five examples are given, the products giving grayish-violets, bluish greens, or violet reds.

Vat Dyestuffs in Solid Form

German Patent No. 466,938 (12/X/'28)—*Gesells. f. Chem. Ind. in Basel.*—Consists of the intimate mixture of the vat dyestuff, non-caustic alkali, hydrosulfite, and in some cases a dispersing agent. Of the alkaline components, soda, of course, comes first, then potash, borax, or (ordinary) sodium phosphate; the dispersing agent may be as in example 1, Monopole soap in 50% solution, and a small amount of sulfite-pulp liquor. The requisite mixing involves wetting the paste (note the use of the dispersing agent) grinding carefully to the desired uniform fineness of consistency, and then drying in vacuum. Such mixtures dissolve in lukewarm water to form the "vat" at once, or at least do so very rapidly, without the need of weighing out the several components, which would otherwise be necessary, and without the loss of time involved in the vatting in the ordinary way.

Azo Dyestuffs (Developed)

German Patent No. 467,634 (*27/X/'28*) (*addition to G. P. No.* 398,484 *of* 22/*XII*/'22)—*I. G. Farben—Ind. A. G.*—The principal patent, No. 398,484, covers the preparation of azo dyestuffs by coupling suitable diazo-salts to oxy-derivatives of naphthophenazines, dinaphthazines, etc., the use of the second or passive components being the point of the patent. An additional patent, No. 455,403, points out that such oxy-azine compounds possess a strong affinity for vegetable fibers, so that they can be used for production of developed dyeings. The present additional patent more

fully covers this possibility, is two definite claims; the possibility of so producing dyeings by successive treatment of the fiber with an alkaline solution of oxy-derivatives of the p-diazine series, and with a solution of a diazo salt; also, the use of the first component in a previously reduced form, as a hydro-derivative. Mention is made of the derivatives specified in the first additional patent.

Eight examples are given.

Wool also can be dyed as above, but naturally very weakly alkaline baths, preferably of carbonate, and also a protective colloid included, are advised.

Dyestuffs for Cellulose Esters and Ethers

German Pat. No. 467,036 (15/X/'28)—*I. G. Farben—Ind. A. G.*—The dyestuffs covered in this patent, which involves the use of 2-4-diamino-diphenyl-methane sulfonic acid, as the second component in azo couplings, differ from most other azo dyestuffs containing a sulfonic group, by possessing a fairly strong affinity for acetate silks. The first components indicated as suitable for diazotizing and coupling are non-sulfonated amines.

Three examples are given—yellow, corinth, orange. (Cf. German Patent No. 468,210 above.)

Indigoid Dyestuff

German Patent No. 469,248 (7/XII/'28) (*addition to G. P. No.* 425,352 *of* 18/I/'24)—*Gesells. f. Chem. Ind. in Basel.*—The method of synthesis here covered (not the one of G. P. No. 425,352, or of an additional patent) consists in the condensation of aromatic nitroso-compounds with 2-3-anthraquinone- or 2-3-anthracene-oxy-thiophene, thus producing the corresponding thio-furane-1-2-dione-anil. Of these, the anil of 2-3-anthracene-thiofurane-1-2 dione is condensed with 2-3-anthraquinone-oxythiophene, and the anil of 2-3-anthraquinone-thiofurane-1-2-dione with 2-3-anthracene-thiophene. The 2-3-anthracene-2'-3'-anthraquinone-thioindigo, etc., thus obtainable cannot be gotten by the method of the other two patents mentioned.

Two examples are given.

Preparation of Cotton for Use with Acid Dyestuffs (Amidated Cotton)

German Patent No. 466,037 (15/X/'28) (*addition to G. P. No.* 438,324 *of* 28/III/'25)—*Dr. Paul Karrer in Zuerich.*—The original patent describes the preparation of amidated cotton by first esterifying it with aryl-sulfonic or alkyl-sulfonic chlorides as usual, to a greater or lesser degree, and then treating such esterified material with ammonia, primary, secondary, or tertiary amines, either aliphatic or aromatic, or with hydrazine or its substitution products, or with solutions of such compounds. The present extension and improvement applies these bases in the gaseous or vapor form. An additional patent, No. 459,-200, has also specified heterocyclic bases, such as pyridine, etc.; these may also be applied in the vapor form. The cotton thus prepared displays a strong affinity for acid dyestuffs, and the dyeings are fast.

Dyestuffs for Acetate Silk

German Patent No. 467,038 (15/X/'28)—*I. G. Farben-Ind. A.-G.*—The dyestuffs here considered are azo dyestuffs, involving diazotized amino-mono-sulfonic and amino-mono-carbonic acids and their substitution products, as the first component, and alpha-gamma-diketo-hydrindene or its derivatives as the second component. The products possess a strong affinity for fibers of the eater or ether type, and, when used in conjunction with dyestuffs of other kinds, suitable for the acetate type of fiber, do not display phototropy.

In the example given, the bath is made up with 30 g. of the ammonium salt of the dyestuff from diazo-sulfanilic acid and the diketo compound, per liter of bath, and the goods dyed at 70° C. for three-quarters of an hour in a 1-30 to 1-40 bath, with or without addition of salts, weak acids, or weak bases. This particular dyestuff gives clear yellows.

Indigoid Dyestuffs and Intermediates

German Patent No. 461,503 (3/VII/'28)—*Gesells. f. Chem. Ind. in Basel.*—A long series of processes, following a fairly straightforward line of synthesis. Beginning with 1-2- or 2-1-halogenated anthraquinone-carbonic acids, these are treated with an alkali sulfide to replace the halogen by a mercaptan group; these products, reduced or not reduced, are condensed with chloracetic acid to form 2-1-anthraquinone-thioglycol-carbonic acids or the corresponding anthracene-thioglycol-carbonic acids; these compounds are treated with condensing agents to form the corresponding oxythiophene derivatives, these by condensation with aromatic nitroso-compounds are converted to the anils of the corresponding 2-1-anthraquinone- or the 2-1-anthracenethiofurane-1-2-diones, and the final products ultimately converted, by condensation with the usual suitable compounds, by mere ordinary condensation, or in some cases by oxidation, into a series of indigoid dyestuffs. These ultimate products are, of course, capable of further modification by halogen, in the usual ways.

Nine detailed examples, with tables of properties of the products, are given.

Perylene Vat Dyestuffs (Chlorinated)

German Patent No. 465,990 (29/IX/'28)—*Felice Bensa in Genoa.*—Perylene-quinone is treated with chlorine, with or without addition of carriers, solvents, or diluting media; the products so obtained are treated with neutralizing agents to remove HCl. The corresponding bromine substitution-products are already known, and dye cotton in orange-yellow tones, but the development of the color by oxidation in the air, at least, takes several hours. In the case of the present chlorine derivative, the chlorine is, of course, much cheaper, the dyeings obtained are developed rapidly, by airing for only a few minutes, and the tones produced are much brighter and greenish—of a tone not often met with in the vat dyestuff series.

● 1934 FALL HOSIERY COLORS

Ten new tones are highlighted in the 1934 Fall Hosiery Card just issued by the Textile Color Card Association to its members. Each of these shades, it was pointed out, has been especially created to complement some significant color note in Fall costumes and shoes.

For early Autumn wear, special emphasis is given light warm browns and dark neutral beige, as interpreted in the three following tones:

Solera—clear golden brown. Blends with a wide range of warm browns, including new chestnut and tobacco types; all greens; rusts; "faded leaf" shades including gold, russet and tawny tones.

Shoes: Marrona; Indies Brown; Tailleur Green.

Cedar—warm brown of coppery undertone. High style complement to rust, coppery and cedar browns. Also keys correctly with yellowish greens and lively hues.

Shoes: Smartest harmonizing shade with Indian Copper. May also be worn with Marrona and Tailleur Green.

Trotteur—dark beige of brownish cast. Harmonizes smartly with neutral browns. May also be worn with greens and black.

Shoes: Indies Brown; Marrona; Biscay Brown; Fawn Brown; Tailleur Green; black.

Highly important as a new fashion theme for late Fall and Winter promotion are the medium and darker brown shades, which will be developed in very sheer hose of fine quality. They take on special significance because of their close harmony with browns of similar tonality stressed in costumes and accessories. In this high style group are:

Marrona—rich brown of the chestnut type. Important complement to a wide range of warm browns. Also smart with greens and rusts.

Shoes: Keyed especially to Marrona leather shade. May also be worn with Indies Brown and Tailleur Green.

Jaffa Brown—dark warm brown. For late Fall and Winter wear with medium and darker browns of similar tonality. May also be worn with dark greens.

Shoes: Indies Brown; Tailleur Green.

Cloister Brown—deep neutral brown. High fashion color for Winter wear with dark browns.

Shoes: French Mahogany; Brown Taupe; Indies Brown.

New renditions of taupe add a smart restrained note to the Fall hosiery picture. Because of their neutral qualities, these subdued shades are appropriate with a wide range of Fall costume and shoe colors. Classified in this taupe family are:

Smokemist—light taupe of beige undertone. Stressed for general wear with navy and medium blues; wine and bluish reds; taupes and greys; purplish tones; as Black Cherry; light greyed browns; bluish greens; black.

Shoes: Marine Blue; Brown Taupe; Flintgrey; Biscay Brown; black.

Fawntaupe—medium taupe of brown cast. Significant shade for wear with new mahogany browns; wine reds; brownish taupes; purplish tones of the "Black Cherry" type; bluish greens; black.

Shoes: French Mahogany; Brown Taupe; Biscay Brown; Tailleur Green; black.

Taupebark—dark taupe of grey cast. Emphasized as an important neutral tone coordinating with darker greys and taupes; navy, wine reds; purplish tones; black.

Shoes: Gungrey; Marine Blue; black.

Classique, a smart flesh tone with a warm glow, has been created especially for evening wear. It may also be profitably merchandised for afternoon occasions, such as the cocktail, dansant or tea hour.

As usual, the hosiery card contains large loose-leaf swatches for dyeing purposes and tabs of the hosiery material as a permanent color record. A practical merchandising feature consists of the coordination notes printed under the tabs, indicating the correct relation of each hosiery tone to the fashionable new colors in Fall costumes and shoes.

● NEW PATENTS

(*Abstracted by S. O. C. M. A.*)

Process of Preparing Ungreenable Aniline Black. (Printing pastes comprising adding an organic heterocyclic nitrogen compound and an oxidizable nitrogenous compound selected from the group consisting of hydroxylamines, hydrazines and nitriles to aniline black dyestuffs.) August Holtmann and Moritz Freiberger, Charlottenburg, Berlin, Ger., No. 1,955,235, 4/17/34.

◎ SANDOZ SAMPLES

The Sandoz Chemical Works has released sample cards on the following products:

Pyrazol Orange G and R—Produce bright shades of orange and have been found useful and economical. They are said to have excellent level dyeing qualities and affinity for various fibers including silk, cotton and all brands of rayon. They can be used for jig dyeing and padding. It is further claimed that they are serviceable for union dyers because of the covering power of both for half-silk, half-wool and gloria. The colors are widely used in hosiery dyeing. The light fastness is claimed to be very good for ordinary direct colors and the R is improved by an aftertreatment with Bluestone. They are both said to be fast to acids, alkalies and rubbing. Immunized cotton and acetate fibers are stained more by the R than the G. Both colors are said to be dischargeable with Hydrosulfite R. F Conc.

Xylene Milling Blue 6G and *Xylene Brilliant Cyanine*—Both of these colors are recommended by the manufacturers for bathing suit purposes because the fastness properties to washing and sea water are said to be excellent. Both colors are also used for worsted top, worsted and woolen yarns and knit goods.

Copies of the above releases may be obtained on request.

OPEN FORUM

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

Answers

12—Please give me a method for dyeing ivory, stating any unusual precautions which it may be necessary to observe.—B. T.

Answer No. 2:—It is the opinion of some that it is impossible to satisfactorily dye animal ivory but among the methods in existence are the following:

The dyeing is done in nested copper kettles, the inner one being perforated so that the contents may be removed from the dye bath without trouble or loss of solution. After nesting the kettles, they are filled with cold water and the pieces of ivory to be dyed. The water is heated to a boil by means of a live steam jet and boiled from 1½ to 2½ hours so as to soften up the hard outer shell of the ivory to insure penetration of the dyestuff. The kettle containing the ivory is transferred to another bath containing warm water (not over 140° F.). It is left here from five hours to overnight and the ivory is then ready to be dyed. The dyes used in this method are natural dyestuffs such as cutch, logwood or sumac with copper sulfate or pyrogallic acid. The copper sulfate is used when gray shades are desired and the pyrogallic acid for browns. In actual work it appears necessary to use two or three colors together to get the proper shade. The dyeing is conducted at about 180° F. and the time depends upon the depth of shade desired. After dyeing the color is developed in a solution of potassium bichromate (15-20%) at about 180° F. The material is rinsed several times to remove the yellow cast of the bichromate. The water is removed by centrifuging and the ivory dried at a low temperature (not higher than 110° F.).

Another method entails the use of powdered prepared dyes which are concentrated natural dyes in powder form. In this method the material does not have to be soaked after boiling. The dye is dissolved, some copper sulfate or pyrogallic acid is added and the bath brought to a boil. The material is then added and boiling continued. This method does not necessitate any development but bichromate is used to darken up the shade.

According to still another method for the preparation of blacks the ivory is first plunged into a hot bath of alkali. It may be boiled but should afterward be plunged into cold water. The ivory should then be bleached with hydrogen peroxide. The unpolished ivory will absorb the dyestuff better than the polished article. Following are two separate processes for obtaining blacks.

Black on Ivory

1. Wash or steep in an alkaline lye solution.
2. Immerse in a weak solution of $AgNO_3$
3. Expose to the sun, thereby developing a black color.

   Note—Instead of (3), the ivory may be dried and dipped in a weak solution of ammonium sulfide.

Heavy Black

1. Clean as above.
2. Prepare a logwood solution and strain.
3. Boil the ivory in the logwood.
4. Steep in a solution of iron acetate or iron sulfate.

For coal tar dyes the following method has been used. It is to be noted however that the dyes which will dye ivory are not generally fast to light. The ivory is first thoroughly cleaned and then etched in acid which removes the outer film of bony material exposing the cartilaginous material underneath. It is necessary to observe extreme caution in this operation as the etching may go too far and prevent satisfactory polishing thereafter. A small amount of HNO_3 is used for the acid etching bath. The acid is then rinsed off and the ivory dyed in the color solution.

Another method which has been recommended is to use a dye which is soluble in alcohol. The ivory is first cleaned with a mild alkaline solution (NH_4OH or Na_2CO_3), etching with acid to increase penetration, and then dyeing. The alcohol solution has no solvent action on the ivory. These dyes are not fast to light and the penetration is very poor.

The chief difficulty in dyeing ivory seems to be in securing sufficient penetration with an adequately fast dyestuff. Preliminary treatments intended to increase the penetration generally have a disastrous effect on the qualities of the ivory as far as polishing and hardness of surface are concerned although if carefully controlled at least partially satisfactory results are obtainable.

The following is a patent abstract which covers the dyeing of bone material.

Method of dyeing bone and the products thereof, etc. Patent No. 1,594,490 August 3, 1926 Elmer C. Bertolet, Philadelphia, Pa., assignor to George K. Hale Manufacturing Co., Phila., Pa., a Corporation of Pennsylvania.

"The herein described method of coloring bone material, consisting of subjecting it to a mixture of coloring matter, stearic acid, benzene and cresol. A bone material or product completely penetrated to a substantial depth with coloring matter."—S. V. W.

9—I am making tallow softeners on a laboratory scale. To what tests can I subject these tallow softeners in order that I ascertain if they will injure the cotton goods, become rancid, or decompose to form an objectionable compound? I am referring to softeners suitable for cotton piece goods only.—**J. E. G.**

Answer No. 2:—Any straight tallow softener that has been correctly sulfonated and I suppose that is the type in mind, washed and neutralized to either a neutral point or slightly on the acid or alkaline side, will have no effect of damaging nature on cotton fiber. It is generally the custom to carry the softener to the slight alkaline side when using. To prevent going rancid which might be called a decomposition, preventatives are necessary. Any of the essential oils, perfumes will prevent rancidity developing. Formaldehyde is also a sure preventative. There is no test but time.—Wm. Taylor Stearns.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Research and plant chemist, rayon processing man, with over ten years of practical experience with leading American and European dyeing and finishing organizations, presently on a business trip in Europe, will be available at the end of September. Write Box No. 818, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED as dyer, application chemist, technical demonstrator salesman, or laboratory supervisor. Ten years' experience as dyer of worsted and woolen yarns and pieces; cotton raw stock, yarns and pieces; rayon yarns and pieces; and hosiery and union fabrics. Four years' experience in laboratory of dyestuff manufacturer doing standardizing, demonstrating and application research. Looking for position offering adequate compensation and future advancement possibilities. Will go anywhere. Single. Age 35. Write Box No. 823, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

EXPERT DYER with 5 years or more practical experience in dyeing cotton yarn piece goods. Location, South America. Must have good knowledge of Spanish language. Single man preferred, about 30 to 40 years of age. Give full particulars about your training, experience, etc. Write Box No. 824, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

YOUNG MAN, age 24, college education, laboratory and practical experience dyeing wool and other fibers, seeks position. Well recommended. Write Box No. 825, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED—Large import and manufacturing concern, having a national sales organization, desires the services of an experienced sales executive to do sales promotion and application work for department handling Tapioca, Sago Flours and similar products. Previous experience essential. Write Box No. 826, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED—Executive dyer, technical and practical dyer of 20 years' experience on all fabrics including Celanese, specialist on mixed goods. Wishes position with responsible firm to take charge of dyeing department. Location no object. Write Box No. 827, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

A SALES EXECUTIVE who has had successful selling experience in textile processing materials for cotton, wool, rayon and silk, will find it profitable to communicate with a nationally known manufacturer of such products. Applications must be in writing, giving complete sales experience, training, age, and references. All letters will be held in strictest confidence. Our organization is fully acquainted with this advertisement. Write Box No. 828, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.